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AUTHOR Sugar, William A.; Bonk, Curtis Jay

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ABSTRACT

This study analyzed new forms of student social interaction and dialogue within asynchronous communications of six middle schools and six high schools participating in the World Forum. In the World Forum, students discussed, questioned, and debated with Arctic explorers, researchers, World Forum mentors, and peers about environmental issues. One of the three key tasks, Flash Points, generated more lengthy dialogue than other techniques (i.e., Arctic Alerts and Questions to Explorers). Analysis of the forms of assistance provided students indicated that mentor interactions with students was mainly to provide feedback, question, and cognitively structure the lesson or activity; minimal instruction or modeling of how to interact occurred. Few student questions about environmental issues or exploratory activities were of an evaluative or analytical nature, but instead, most were fact or knowledge-based. Despite the minimal assistance and low-level of questioning, student role taking activities within their environmental discussions (students assumed roles of famous people such as Stephen Jay Gould and Richard Leakey) enhanced the degree of perspective taking in their conversations. Examining the interaction patterns, forms of mentor assistance, level of questioning, and degree of perspective taking provided new insights into the impact of electronic communication on student learning, but additional assessment techniques are still needed. Four tables illustrate data. An appendix lists a sample of character roles played by some World Forum participants. (Contains 56 references.) (Author/MAS)

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Title:

World Forum Communications: Analyses of Student and Mentor Interactions

William A. Sugar
Indiana University
School of Education: Room 2276
201 Rose Avenue
Bloomington, IN 47405-1006
(812) 856-8205 ext. 33980
wsugar@indiana.edu

Curtis Jay Bonk
Indiana University
School of Education: Room 4022
201 Rose Avenue
Bloomington, IN 47405-1006
(812) 856-8353
cjbonk@indiana.edu

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Abstract

This study analyzed new forms of student social interaction and dialogue within asynchronous communications of six middle schools and six high school participating in the World Forum. In the World Forum, students discussed, questioned, and debated with Arctic explorers, researchers, World Forum mentors, and peers about environmental issues. One of the three key tasks, Flash Points, generated more lengthy dialogue than other techniques (i.e., Arctic Alerts and Questions to Explorers). Analysis of the forms of assistance provided students indicated that mentor interactions with students was mainly to provide feedback, question, and cognitively structure the lesson or activity; minimal instruction or modeling of how to interact occurred. Few student questions about environmental issues or exploratory activities were of an evaluative or analytical nature, but, instead, most were fact or knowledge-based. Despite the minimal assistance and the low-level of questioning, student role taking activities within their environmental discussions (here, students assumed roles of famous people like Professor Stephen Jay Gould and Mr. Richard Leakey) enhanced the degree of perspective taking in their conversations. Examining the interaction patterns, forms of mentor assistance, level of questioning, and degree of perspective taking provided new insights into the impact of electronic communication on student learning, but additional assessment techniques are still needed.

Introduction

As society rides the crest of the Information Age wave, futuristic predictions become pedestrian (Naisbitt, 1984; Schrage, 1990; Toffler, 1980). In theory, students and teachers soon will have access to "the best" information regardless of "geography, distance, resources, or disability." At the same time as these new technologies advance opportunities for student-student distance collaboration and dialogue, many educators are turning to sociocultural theories like Vygotsky's (1986) to analyze learning in a social context (Tharp & Gallimore, 1990; Wells, 1994). Disappointed with learning theories that advocate discrete or inert knowledge, research on the social context of learning lends support to a more learner-centered school pedagogy (Alexander & Murphy, 1994; The Cognition and Technology Group at Vanderbilt, 1991; Duffy & Jonassen, 1991; Tharp, 1993). The collaboration, negotiation, questioning, and scaffolding of more "active" learning environments is drawing attention to this movement.

This study offers one glimpse of what how these trends in technology and learning theory might be married. Tools for writing and conversation, for instance, are elevating many school activities from silent, solitary acts, to one's rich in student discussion, dialogue, and debate (Bonk, Medury, & Reynolds, 1994). However, researchers have yet to make significant progress regarding how cognitive processes displayed on a social plane such as electronic mail and dialogue eventually become internalized by the participants as independent problem solving skill (Wertsch, 1985). Before sociocultural ideas can impact educational reform, new approaches are needed to observe and measure the impact of intermental activities (e.g., student collaboration over an electronic network) on intramental processes (Meloth & Deering, 1994; Wertsch, 1991).

One of the major purposes of this study is to describe and analyze student interactions while using an information age tool (i.e., the Internet). Innovative educational activities were used to apprentice young learners into actual environmental and scientific explorations. As a result, opportune questions regarding the social and cognitive benefits of new interaction patterns must now be raised in regards to types of mentorship, interaction patterns, levels of questioning, and the interpersonal impact of shared meaning. Just what types of interaction and forms of learning assistance does this type of information highway provide? How might students be apprenticed in their initial attempts to drive the highway and form new learning collaborations? These are a couple of the questions that emerge when learning theories are married to deliverable technologies.

A Sociocultural Lens on-Line Collaboration

Among the ramifications of Information Age educational tools such as the Internet is collaborative computing. For example, students might send messages to distant people or distinguished experts on a topic, while teachers are collaborating with their colleagues. Ishii (1993) asserted that the increasingly use of telecommunications will build an "essential foundation" for collaboration. Collaborative work in online

communities becomes an effective way of using these information age tools (Harasim, 1989; Ruopp, Gal, Drayton, & Pfister, 1993). If predictions hold, students will be empowered and proactive in their collaborative learning processes. Riel (1993), for instance, argues that these online communities will provide a global education for students, enabling them to see the complexity of the world through other viewpoints. Through collaborative environments, students can appreciate the complexity of issues and consequences of their actions. According to Riel, this global community can promote positive attitudes and greater global awareness.

Riel (1985) contends that these new possibilities for cooperative learning and students' interactions engage students in a process of creating shared meanings. In her opinion, online networks create new possibilities of teaching and learning by "facilitating group communication among classrooms and teachers" (Riel, 1990) and fostering collaborative production and analysis of information (Riel, 1992). Bannon (1986) similarly notes that computer-mediated communication (CMC) will "help to create new communities of people, bound by a shared interest in a topic or a shared background." Hence, the interaction between humans and computers should not only be investigated through a cognitive lens, but also through a social lens (Brown, 1986; Scott, Cole, & Engel, 1992). Brown indicates the need to observe and make sense of the social interactions of users who interact with collaborative, online systems. In such an analysis, one begins to distinguish how students can broaden their perspectives through global education and computer-mediated communication and become full participants in it (Riel, 1993).

Theoretical Framing of this Sociocultural Lens

In this developmental theory, human mental functioning is inherently situated in social interactional, cultural, institutional, and historical context (Wertsch, 1991). Basically, an individual derives meaning from the tools and signs mediating his social and individual environment within the phase of development Vygotsky refers to as the zone of proximal development (ZPD) (Salomon, 1988; Wertsch, 1991). A ZPD, the distance between a child's independent problem solving level and the that obtained under adult guidance or in collaboration with more capable peers, might be evident when peers can teach other students about his or her particular community when using on-line technologies. Note that recent collaborative writing studies lend evidence that students' internalize the scaffolding of more capable peers when collaboratively writing (Daiute and Dalton, 1988) as well as the cognitive supports or prompts provided by computer tools (Salomon, 1988; Zellermayer, Salomon, Globerson, & Givon, 1991). However, Salomon (1993) cautions that intellectual benefits will depend on the extent of student "mindfulness" or engagement when collaborating with peers using technology.

More capable peers or adult guides on a computer network may lead students into writing or communication tasks in which they might not typically consider or address. Likewise, from a Piagetian standpoint, debating and dialogue with peers over a network guides and challenges learners to new levels of growth and understanding (Clements & Nastasi, 1988). When confronted by alternative views and opinions, cognitive dissonance or disequilibrium is triggered, thereby causing individuals to seek additional information to resolve to conflict (Piaget, 1963). Both Vygotskian and Piagetian theory, therefore, seem to have foreshadowed the emergence of collaborative technologies.

Another developmentalist, Robert Selman (1980), suggested that educators need to devise new ways for students to progress beyond their egocentric views of the world. His construct, perspective-taking or social cognition (i.e, "to infer another's capabilities, attributes, expectations, feelings and potential reactions," Selman, 1971) has been studied in a variety of settings during the past thirty years. Similar to Piaget's (1963) cognitive developmental theory, Selman (1976, 1980; Selman & Byrne, 1974) has outlined a social cognitive developmental model with five distinct stages. Selman proposed that children gradually decenter from egocentric points of view to the ability to take into account one or more points of view simultaneously. For instance, the sharing of views on a computer screen might foster meaning making activities and interpersonal understanding. Such shared experiences with distant peers on a computer network offers a window into how points of view diverge and a channel for displaying them. Clearly, situating the idea of role play within an electronic collaborative network, enhances the opportunities for developing social cognitive skills.

Merging Theory and Technology With Cognitive Apprenticeships

Though global education might elevate social cognitive skill and scaffold the learning process, there is no guarantee that collaboration and interaction will trigger critical reflection on one's ideas or enhance interpersonal understanding. New forms of mentoring and teaching assistance might address this dilemma (Tharp & Gallimore, 1988). But how might one assess the forms of this teaching assistance? How might social interaction and discourse be altered by the participant structures and degree of status among the participants? How might cognitive engagement be augmented by the task structuring and questioning provided by electronic mentors?

Evidently, scaffolding and feedback is not restricted to one's peers and classroom teacher, but now guidance comes from other teachers, consultants, and experts who apprentice learning in these new forums. As a result, the "social and intellectual connectivities" (Harasim, 1989, p. 39) afforded by collaborative technologies advance both the educational boundaries and concerns. Expanding the frontier of education, naturally, places the participants in uncharted waters. Regardless of the terminology--coordinators, coaches, advisors, or guides--the apprenticing opportunities are central to success here. Lehrer, Erickson, Love, and Connell (in press) asserted that the notion of an apprenticeship might translate sociocultural principles into "good" instructional practice. In a related article, Lehrer (1993) contends that instructional practices within apprenticeship environments, therefore, might guide students into the learning process, promote student design of knowledge, multiple representations of that knowledge, and student-student dialogue, integration, and presentation of that knowledge (Lehrer, 1993). Rogoff's (1991) findings that adult-child dyads often foster more sophisticated problem solving then child-child dyads support apprenticeships or "guided participation" educational activities.

Guided learning activities that involve students in challenging and internally controllable activities empower learners and facilitate their active construction of knowledge (Wells & Chang-Wells, 1992). According to Wells and Chang-Wells, assisted performance might further draw students into an inquiring community of learners. As experts in the community assist novice learners in assuming a greater portion of the responsibility or intellectual burden of the task, they begin to appropriate and internalize authentic cultural practice. Using technology to build communities of practice and apprentice less skilled learners through social interaction and dialogue is now possible through a on-line educational network. An expert can arrive on a network and participate with learners in a joint learning activity wherein the expert might provide data, demonstrations, or hypotheses. Novice learners, in contrast, might seek additional information, ask questions, or offer tentative conclusions and recommendations. Teachers or cognitive coaches might mediate between these two roles, by establishing the initial goals or tasks, stating necessary assumptions, model expected thought processes, and guiding the overall learning process through support, hints, and clues (Collins, Brown, & Newman, 1989).

Since the seminal article on the emergence of cognitive apprenticeships in education by Collins et al. (1989), educators have sought new avenues for creating mentor-apprentice relationships and embedding the learning in a more legitimate social context. Instead of a continuation down the path to inert knowledge, schools are searching for maps to more realistic learning situations and avenues. The cognitive apprenticeship reviewed here is one plausible means to realize these goals.

Method

The World Forum Activities

The World Forum, developed by the University of Michigan, is a key component of the World School for Adventure Learning currently regulated at Indiana University. The World Forum is an online asynchronous telecommunications project designed to give middle and high school students the opportunity to interact with each other about critical environmental and social issues. This particular analysis involved students in six middle schools and six high schools participating in the World Forum.

As World Forum participants, a student group (with two or three students) would assume the identity of a famous person; for example, one student group might represent Jacques Cousteau while another student group might represent Margaret Thatcher (see Appendix A). These students would conduct background research on their particular character in order to effectively participate in the World Forum explorations and activities. Additionally, the student groups were expected to connect online with the World Forum daily.

There were four main participants in the World Forum: (1) World Forum organizers, (2) World Forum mentors, (3) World Forum participants (i.e., students) and (4) Arctic explorers. The World Forum organizers created two key activities: *Flash Points* and *Arctic Alerts*. In one activity, student groups were asked to respond to statements called *Flash Points*, in similar manner the character they were assigned to researched. For example on a Likert scale (where Strongly agree = 1 and Strongly disagree = 5), students would voice their opinion on a statement such as, "The pen is mightier than the sword". They would either agree or disagree with this Flash Point and state their reasons for their particular opinion.

Arctic Alerts, the second instructional activity, were news reports that described critical environmental and social issues in the Arctic region. One *Arctic Alert* explored the issues of oil exploration on native Eskimo's land. World Forum participants responded positively or negatively to these issues. World Forum student groups also received reports from an Arctic expedition conducted in the Spring of 1994. Student groups were encouraged to pose questions to the Arctic expedition team. Though participation ultimately varied, students were instructed to log-in to the World Forum each day and voice their responses to the aforementioned activities. As part of the instructional design of the World Forum, throughout these interactions the student groups were assisted by World Forum mentors who questioned and guided the student groups' understanding of these environmental issues.

Student interactions via the World Forum lends insight on the process of effective and ineffective asynchronous collaboration. By analyzing these processes, asynchronous on-line communications designs can be improved. There are several important questions to ask about the nature of this type of collaboration. First of all, what kinds of social spaces do participants feel comfortable and uncomfortable in? Secondly, what kinds of communication facilitate a common sharing of knowledge? Third, how are shared meanings constructed? However, since this paper is concentrating on the mentor-student relationship, it is important to ask about the types of learning assistance specifically provided within these virtual cultures. That is, how do these teleapprenticeships (Levin et al., 1987; Teles, 1993) guide their students/tutees through this new medium and successfully communicate with other peers.

In addressing these questions and concerns, the research turns from hardware connection and information access issues to ones regarding how mentor assistance and scaffolding is embedded in e-mail dialogue. The analysis tools and coding schemes chosen here offer insight into the how social interaction impacts student learning. These coding schemes were designed to provide insight into how to measure the activity setting of collaborative computing. The four variables chosen are discussed below.

Data Analysis Procedures

To analyze the interactions between World Forum participants and their mentors, all World Forum discussion strands from the participants and mentors but not explorers were subscribed to. After the World Forum finished approximately eight weeks later, this data was downloaded and printed out for further analyses. As noted previously, only student and mentor interchanges were saved and analyzed here; explorer notes to students were not included in this analysis. By having students assume fictitious identities, all student data was anonymous. All dialogue data was time and date stamp with school indicators. Though student participants were asked to log on each day, more activity was logged during the first few weeks than during the later weeks.

Four analysis techniques emerged after surveying the three key social interaction activities of the World Forum mentioned earlier, namely, Flash Points, Arctic Alerts, and Student Questions to Arctic explorers. The different analysis techniques selected here were based on the particular content of these three activities. Below, we briefly describe each analysis technique and how we applied these techniques to World Forum interactions.

I. Interaction Tabulations and Analyses

The first analyses of the middle and high school data entailed counting the number of student generated interactions concerning the Flash Points, Arctic Alerts, and Student Questions to Explorers. After taking out interaction headers, a computer count of the total number of words composed by middle school and high school students during the three activities. The number of interactions was divided into the total word counts to calculate words per interaction. Counts of the number of mentor-student interactions also were noted.

II. Tharp and Gallimore's six means of assistance

Tharp and Gallimore (1988) offer insights into effective means of facilitating students understanding. With their argument that schools should provide assistance for the entire school community, Tharp and Gallimore identified six means of assisting performance including: Modeling, Contingency Management, Feeding-back, Instructing, Questioning, and Cognitive Structuring. These six techniques of assisting understanding can contribute in facilitating both mentor and students participation in Collins et. al.'s (1989) cognitive apprenticeship. Thus, interactions between mentors and World Forum middle school and high school were coded using Tharp and Gallimore's framework. Questions of interest included whether the assistance varied across group and task structure, as well as, over time. For instance, what types of learning assistance do students need? And does this mentors assistance vary with younger students and older students or from beginning to later sessions? To begin to discern answers, percentages of interactions involving each assistance mode were calculated for both grade levels as well as overall interactions.

III. Bloom's taxonomy of educational objectives

Paralleling the forms of assistance, was a concern with the level of questioning in electronic social interaction and discourse. Though decades old, Benjamin Bloom's (1956) cognitive taxonomy from low level knowledge, comprehension, and application goals to high level analysis, synthesis, and evaluation educational objectives was useful in analysis electronic discourse. Though these question types have been used during the past four decades to illustrate the lack of high-level questioning in the classroom, perhaps electronic interaction in a community of discourse would elevate observed questioning level. Bloom's taxonomy definition helped measure the levels of thinking that World Forum participants used when asking questions to Arctic explorers. We speculated whether engaging in the other World Forum activities (i.e., Flash Points and Arctic Alerts), students would gain more expertise and express this new knowledge with higher level questions. Moreover, would students internalize and exhibit the types of questions asked by their World Forum mentors?

IV. Selman's Perspective-Taking

In adopting the latter four of Selman's (1980) perspective-taking categories, coded interactions with both the Flash Points and the Arctic Alerts with Selman's perspective-taking coding scheme. The primary question asked was whether students' perspective-taking would be enhanced in one activity rather than another one. Would students' responses to Arctic Alerts encourage higher levels of perspective taking than Flash Points? Secondly, we asked whether older students would exhibit higher levels of perspective-taking than middle school students. Of course, most students in World Forum interactions involved role playing from the perspective of a famous person; hence, participants were already at operating above initial egocentric level.

Results

In first, taking a quantitative look at the data, we found that the number of interactions recorded in World Forum (see Table #1), both middle and high school students wrote a similar amount of messages (Flash Points, Arctic Alert responses, and Questions to Arctic explorers). The Flash Point activity was used the most. It is interesting to note that high school students used much more words per average in Flash Points and their Student Questions to Explorers than middle school students (i.e., 7805 words as opposed to 4808 words in Flash Points; 1030 words as opposed to 625 words in Student Questions to

Explorers). Surprisingly, the student interaction activity decreased during the eight weeks and direct student-student interaction throughout the project was minimal.

Table 1 also indicates that World Forum mentors focused the Arctic Alert activity on middle school students (i.e., 7 as opposed to 1), whereas their Flash Points and Student Questions to Explorers provoked more high school student interactions (31 and 13 interactions, respectively, for high school students compared to 15 and 1 middle school).

World Forum mentor interactions, the coding scheme based on Tharp and Gallimore's forms of learning assistance (see Table #2), disclosed that the Questioning technique was the most frequently used with novices. Surprisingly, one of the six forms of assistance, namely modeling, was totally absent. Mentors could have used this technique to promote more interactions among students. For instance, in the beginning of the World Forum, modeled interactions could be demonstrated to middle and high school students. This technique would lay the ground work on how to properly interact with other World Forum participants. The Contingency Management also could have been used to facilitate this interaction. In the beginning of the World Forum, mentors could have reminded World Forum participants that they should respond to their counterparts. By "managing" these students, there could have possibly been more peer interactions. Overall, World Forum mentors did a good job of asking questions and providing cognitive structure to the task, but failed to provide a framework of how students should properly interact with one another.

A majority of both middle school and high school student questioning activities to the Arctic explorers (see Table #4) appear to be at lower-level thinking on Bloom's taxonomy (i.e., Knowledge and Comprehension levels). There was no apparent transfer, therefore, from engaging in the other World Forum activities (i.e., Flash Points and Arctic Alerts). However, since there were only thirty questions, this speculation cannot be confirmed. Again, we would recommend that World Forum mentors and staff model higher-level questions for World Forum students or give out sample questioning sheets to guide their early interactions.

Examining students' perspective-taking abilities (see Table #5), we found that both World Forum activities (i.e., Flash Points and Arctic Alerts) promoted higher-level perspective taking. Though 51% of middle school students' responses to Flash Points were scored a "1" (Subjective perspective-taking), almost 20% of their responses were a "4" (Societal perspective-taking) (see Appendix E for sample of each perspective-taking level within Arctic Alerts responses). High school students fared better with Flash Points; 26% of their responses were a "3" (Third-person perspective-taking) and 31.4% of their responses were a "4" (Societal perspective-taking). For Arctic Alerts, both middle and high school students had higher perspective-taking levels. In fact, it appears that Arctic Alerts promoted more "3" perspective-taking among both groups of students than its Flash Point counterpart. In either case, high schools were interacting at a predictably higher level of perspective-taking than middle school youth.

Conclusion and Implications

The World Forum, developed by the University of Michigan, simulated an on-line discussion between middle and high school students about critical environmental issues. The intention of this instructional activity was for students to assume the identities of famous characters and communicate with their peers, explorers, and mentors about these environmental issues. Student interactions on the World Forum, were analyzed using four different analysis methods, namely, frequency of responses as well as analyses derived from the work of Tharp and Gallimore (1988), Bloom (1956), and Selman (1971). Results indicate that the World Forum participants assumed higher levels of perspective-taking, but lacked any significant amount of peer collaboration. World Forum participants demonstrate fairly high perspective-taking abilities while engaging in Flash Points and Arctic Alerts. The longer and more contemporary, Arctic Alerts, were responded to at a slightly more higher level. Though students demonstrated these higher-level abilities, especially high school students, they did not transfer this knowledge when asking questions to Arctic explorers. Instead their questions remained primarily at the Knowledge and Comprehension levels. Combined with the findings on mentor assistance, our results indicate that proper mentoring for students engaging in computer-mediated communications, should extend beyond mentors providing tasks and questions to better organizational the task and model appropriate responses.

The analyses also corresponded with expectations of developmental differences from middle to high school. High school students, on average, wrote more lengthy responses than middle school youth. More specifically, grade level differences indicate that the longer and more concrete Arctic Alerts may provoke more discussion among middle school students than high school students. The fact that the more thought-provoking Flash Points and Student Questions to Explorers were utilized by older students corresponds with their ability to reason at high levels than younger students (Piaget, 1963). In terms of direct form of assistance, mentors provided equivalent amounts of feedback, questioning, instructing, and cognitively structuring the tasks to both age groups, but used behavioral management slightly more often with younger students. In terms of level of questioning, too few questions were asked to infer any developmental differences. Finally, the perspective taking analyses indicated that older students responded to Flash Points and Arctic Alerts at more often at Selman's upper levels of social cognitive ability or judgment than the early adolescent students in this study. As predicted (Muuss, 1988), as children mature, role taking activities or the ability to make inferences about the other people's capabilities and potential reactions become easier. Overall, these codings of electronic data, though tentative, begin to detail why innovative social interaction formats may need to consider student developmental level.

The World Forum is promoted as an exemplar tool for students to engage in critical environmental and social issues from another person's perspective. It is a means to marry simultaneous advances in theory and technology. Through programs like the World Forum, electronic collaboration between students, teachers, and experts is beginning to dramatically impact educational settings by fostering more learner-centered activities and opportunities to socially share meaning. In using the Internet, several novel, on-line educational activities were created to communicate with peers, assume roles, and create meaning and share opinions with researchers and explorers. As more apprenticing opportunities emerge from computer-mediated communication environments, additional understandings are needed of how the intermental processes among participants become internalized as independent problem solving processes. Extensive research is needed to examine how best to design similar instructional tools.

Future research ideas spin-off from each limitation of this study. First of all, we did not manipulate the interactions among participants, but simply analyzed the social interaction and dialogue of students and schools within an existing program. In a follow-up effort, researchers might want to suggest tasks or collaboration patterns that participants will use. Variations in the role taking or questioning of explorers, for instance, may enhance the findings found here. At the same time, additional training of mentors or explorers may scaffold their ability to model higher levels of thinking, questioning, and perspective taking than witnessed here. Peer training also may prove fruitful, since few of the student interactions noted here directly addressed peers at participating schools. Of course, other researchers might want to perform similar analyses on the piece of data we were missing, namely the explorer responses and written notes to the student participants. Third, the researchers here simply downloaded existing data without verifying their interpretations with the teachers or students. In contrast to this approach, researchers might want to use social interaction data as an instructional tool that students and teachers would evaluate both before and after it was coded for form of assistance, questioning, and perspective taking. In fact, such dialogue transcripts might be useful for preservice teacher education programs struggling with how to concretize sociocultural concepts such as scaffolding, zones of proximal development, and assisted learning. Of course, though student competence is the ultimate goal, we did not compare student performance or address learning transfer to other classroom activities.

Despite these limitations, some of the tasks and approaches used here help clarify the impact of social interaction on student learning. Human learning and development theory was used as a guide in assessing the impact of new technologies and interaction structures. Certainly these coding schemes for analyzing questions asked, help provided, and perspectives taken can be further refined or altered for other collaboration formats. Indeed, there are additional variables, coding schemes, technologies, and instructional design models to consider. Though network and on-line education technologies are changing faster than research studies can be designed, in this study, we used four assessment techniques that were specific to the social interactions and mentorship of the World Forum. It is a start. Future activities might explore additional World Forum data and fine-tune these initial social interaction coding schemes for collaborative learning and e- mail dialogue. Nevertheless, we are beginning to peer into how social interaction and discourse influence electronic group activities and resulting cognitive change.

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Table 1.
Student Interaction by Activity in World Forum Dialogue

Interactions/Activity	#of messages	# of words	Average # words	# of mentor/student interactions
Flash middle school:	101	4808	39	15
Flash high school:	123	7505	77	31
Arctic middle school:	56	4369	78	7
Arctic high school:	45	3898	86	1
Questions middle school:	16	625	39	1
Questions high school:	13	1030	79	3

Table 2
Forms of Teaching Assistance in World Forum Dialogue
(Note: usually, there were more than one mode of assistance per mentor-student interaction; hence, there are more assistance techniques than interactions. Also, modeling was not displayed by World Forum mentors.)

	Fdbk	Q'ing	Cog. Struct.	Instruct.	Model	Cont. Manag.
Flash middle school:	2	9	4	3	0	2
Flash high school:	7	25	15	5	0	0
Arctic middle school:	4	4	3	0	0	2
Arctic high school:	1	1	1	0	0	0
Questions middle school	1	1	0	0	0	0
Questions high school:	9	12	5	6	0	0

Table 3.
Forms of Teaching Assistance in World Forum Dialogue

Middle School Total: 35 Mentor-Student Interactions
- Feedback- 20%
- Questioning- 40%
- Cognitive Structuring- 20%
- Instructing- 8.5%
- Modeling- 0.0%
- Contingency Management- 11.4%

High School Total: 87 Mentor-Student Interactions
- Feedback- 19.5%
- Questioning- 43.6%
- Cognitive Structuring- 24.1%
- Instructing- 12.6%
- Modeling- 0.0%
- Contingency Management- 0.0%

Overall Total: 122 Mentor-Student Interactions
- Feedback- 19.6%
- Questioning- 42.6%
- Cognitive Structuring- 22.9%
- Instructing- 11.4%
- Modeling- 0.0%
- Contingency Management- 3.2%

Table 4.
Level of Student Questions to Arctic Explorers in World Forum Dialogue

	Know.	Compre.	Applic.	Anal.	Synth.	Eval.	Total:
Middle School:	5	6	0	1	0	4	16
High School:	7	5	0	1	1	0	14
Overall:	12	11	0	2	1	4	30
	40%	36.7%	0.0%	6.7%	3.3%	13.3%	

Appendix A
Sample of characters role played by Some World Forum participants

Green Delegation
- Professor Stephen Jay Gould
- Monsieur Jacques Cousteau
- Senor Roberto Clemente
- Senora Eva Peron
- Professor Sissela Bok
- Mr. E. F. Schumacher

Purple Delegation
- President Lech Walesa
- Ms. Petra Kelly
- Pope John Paul II
- Prime Min. Kazimiera Prunskiene
- Mr. Ernest Hemingway
- Mr. Stephen Biko